

What is claimed is:

1. A centrifuge apparatus for processing blood comprising a bottom spring-loaded support plate;
5 a top support plate; an axial inlet/outlet for blood to be processed and processed components of the blood, the axial inlet/outlet being attached to the top support plate by a rotating seal assembly; a variable volume separation chamber mounted between the bottom support plate and the top support plate, the variable volume separation chamber being fluidly connected to the axial inlet/outlet; 10 a pump fluidly connected to the axial inlet/outlet; and a rotary drive unit attached to the bottom support plate, wherein the top support plate is fixed vertically and the bottom spring-loaded support plate is mounted on springs that maintain pressure on the variable volume separation chamber and allow the bottom support plate to move vertically.
15
2. An apparatus of claim 1, wherein the top support plate is disposable.
- 20 3. An apparatus of claim 1, wherein the variable volume separation chamber is a disk-shaped bag.
4. An apparatus of claim 3, wherein the disk-shaped bag is disposable.
- 25 5. An apparatus of claim 1, wherein the pump is a peristaltic pump.
6. An apparatus of claim 1, wherein the rotary drive unit and the pump are both controlled automatically by a processing unit.

7. An apparatus of claim 1, wherein the axial inlet/outlet is connected to a container for blood and to a plurality of containers for receiving separated components of the blood.

5 8. An apparatus of claim 7, further comprising a multi-position valve for controlling intake of blood from the container for blood and outlet of processed blood components from the axial inlet/outlet to the plurality of containers for blood.

10 9. An apparatus of claim 8, wherein the multi-position valve has four positions.

10. An apparatus of claim 8, wherein the multi-position valve has a position in which two separate fluid conduits are provided.

15 11. An apparatus of claim 8, wherein the multi-position valve is controlled automatically by a processing unit.

20 12. An apparatus of claim 7, wherein the container for blood and the plurality of containers for receiving separated components of the blood are disposable.

13. An apparatus of claim 7, further comprising a sensor for detecting the presence of blood and blood components.

25 14. An apparatus of claim 1, wherein the rotating seal assembly comprises a one piece lip seal.

15. An apparatus of claim 1, wherein the bottom support plate comprises a graduated scale that shows the amount of fluid present in the variable volume separation chamber.

5 16. A method of processing blood comprising:
providing a centrifuge apparatus, the centrifuge apparatus comprising
a bottom spring-loaded support plate;
a top support plate;
an axial inlet/outlet for blood to be processed and processed components of
10 the blood, the axial inlet/outlet being attached to the top support plate by a rotating
seal assembly;
a variable volume separation chamber mounted between the bottom support
plate and the top support plate, the variable volume separation chamber being
fluidly connected to the axial inlet/outlet;
15 a pump fluidly connected to the axial inlet/outlet; and
a rotary drive unit attached to the bottom support plate,
wherein the top support plate is fixed vertically and the bottom spring-
loaded support plate is mounted on springs that maintain pressure on the variable
volume separation chamber and allow the bottom support plate to move vertically;
20 introducing a quantity of blood into the variable volume separation
chamber;
centrifuging the blood; and
removing the separated components of the blood through the axial
inlet/outlet.

25 17. A method of claim 16, wherein the blood is centrifuged for from 5 to
15 minutes.

30 18. A method of claim 16, wherein the separated components of the
blood are removed while the bottom support plate is still spinning.

19. A method of claim 16, wherein the quantity of blood introduced is from 20 to 200 ml.

5 20. A method of claim 16, wherein the top support plate is disposable.

21. A method of claim 16, wherein the variable volume separation chamber is a disk-shaped bag.

10 22. A method of claim 21, wherein the disk-shaped bag is disposable.

23. A method of claim 16, wherein the pump is a peristaltic pump.

15 24. A method of claim 16, wherein the rotary drive unit and the pump are both controlled automatically by a processing unit.

25. A method of claim 16, wherein the axial inlet/outlet is connected to a container for blood and to a plurality of containers for receiving separated components of the blood.

20 26. A method of claim 25, further comprising a multi-position valve for controlling intake of blood from the container for blood and outlet of processed blood components from the axial inlet/outlet to the plurality of containers for blood.

25 27. A method of claim 26, wherein the multi-position valve has four positions.

30 28. A method of claim 26, wherein the multi-position valve has a position in which two separate fluid conduits are provided.

28. A method of claim 26, wherein the multi-position valve is controlled automatically by a processing unit.

5 29. A method of claim 25, wherein the container for blood and the plurality of containers for receiving separated components of the blood are disposable.

10 30. A method of claim 25, further comprising a sensor for detecting the presence of blood and blood components.

31. A method of claim 16, wherein the rotating seal assembly comprises a one piece lip seal.

15 32. A method of claim 16, wherein the bottom support plate comprises a graduated scale that shows the amount of fluid present in the variable volume separation chamber.

20 33. A centrifuge apparatus for processing blood comprising a bottom support plate; a top support plate; an axial inlet/outlet for blood to be processed and processed components of the blood, the axial inlet/outlet being attached to the top support plate by a rotating seal assembly;

25 a variable volume separation chamber mounted between the bottom support plate and the top support plate, the variable volume separation chamber being fluidly connected to the axial inlet/outlet; a pump fluidly connected to the axial inlet/outlet; and a rotary drive unit attached to the bottom support plate,

wherein the top holder is fixed vertically and the bottom support plate is mounted on a mechanical actuator that maintains pressure on the variable volume separation chamber and allows the bottom support plate to move vertically.

5 34. An apparatus of claim 33, wherein mechanical actuator is controlled automatically by a processing unit.

35. An apparatus of claim 33, wherein the mechanical actuator is a ball-screw actuator.

10 36. A disposable cartridge comprising a plurality of ports for receiving or dispensing blood or blood components and a fluid sensor pathway for displaying blood or blood components for analysis, the cartridge being adapted to be mounted on a multi-position valve for directing flow between the ports and the 15 fluid sensor pathway being adapted to be mounted adjacent to one or more sensors for analyzing blood.

20 37. A disposable set comprising:
a container for blood;
a plurality of containers for receiving separated components of the blood;
a disk-shaped bag;
a top support plate for a centrifuge;
an axial inlet/outlet for blood to be processed and processed components of the blood, the axial inlet/outlet being attached to the top support plate by a rotating 25 seal assembly;
and tubing.

38. A disposable set of claim 37, further comprising a disposable cartridge comprising a plurality of ports for receiving or dispensing blood or blood components and a fluid sensor pathway for displaying blood or blood components

for analysis, the cartridge being adapted to be mounted on a multi-position valve for directing flow between the ports and the fluid sensor pathway being adapted to be mounted adjacent to one or more sensors for analyzing blood.

5 39. A centrifuge apparatus for processing blood comprising
a bottom spring-loaded support plate;
a top support plate;
an axial inlet/outlet for blood to be processed and processed components of
the blood, the axial inlet/outlet being attached to the top support plate by a rotating
10 seal assembly;
a variable volume separation chamber mounted between the bottom support
plate and the top support plate, the variable volume separation chamber being
fluidly connected to the axial inlet/outlet;
a pump fluidly connected to the axial inlet/outlet; and
15 a rotary drive unit attached to the bottom support plate,
wherein the top support plate is fixed vertically and the bottom spring-
loaded support plate is mounted on springs that maintain pressure on the variable
volume separation chamber and allow the bottom support plate to move vertically,
and
20 wherein a disposable cartridge has been mounted on the apparatus, the
disposable cartridge comprising a plurality of ports for receiving or dispensing
blood or blood components and a fluid sensor pathway for displaying blood or
blood components for analysis, the cartridge being adapted to be mounted on a
multi-position valve for directing flow between the ports and the fluid sensor
25 pathway being adapted to be mounted adjacent to one or more sensors for
analyzing blood.

40. An apparatus of claim 39, wherein the disposable cartridge snaps on
to the apparatus.

41. A disposable bag comprising three compartments separated by perforated portions that allow each compartment to be separated from the others, each compartment being adapted to contain blood or blood products.